

Remarks

Reconsideration of the application is respectfully requested in view of the foregoing amendments and following remarks. Claims 1-26 remain pending in the application. Claim 1 and 23 have been amended.

Novelty over Schiffbauer '986

Claim 1 has been rejected under 35 U.S.C. § 102(b) over Schiffbauer et al., U.S. Patent 5,939,986 [hereafter Schiffbauer '986]. Applicant respectfully traverses the rejection.

Claim 1 is amended herein for clarity. Amended claim 1 recites, “a receiver for receiving a directional signal indicating proximity of a hazard, and including circuitry that indicates a level of the received directional signal in a plurality of different directions;...” This claim element is not taught or suggested by Schiffbauer '986.

Schiffbauer '986 describes a hazardous warning system, in which a receiving means 26 includes a ferrite loop antenna 50. As discussed in the Background section of this application, the receiver with the single ferrite loop antenna described in Schiffbauer '986 produces a signal indicating the level of the received signal in only a single direction – along the axis of the antenna. (See, Specification at page 2, line 29 through page 3, line 7.) Accordingly, Schiffbauer '986's description of a receiving means with a single ferrite loop antenna 50 fails to teach or suggest the recited “circuitry that indicates a level of the received directional signal in a plurality of different directions.”

The Office cites to column 4, line 38 through column 5, line 22 for disclosure of “circuitry that indicates a level of received signal in a plurality of different directions.” However, this passage describes, “the transmitter antenna 30 takes the form of a plurality of separate wire loops 32, 34 and 36, with each wire loop being strung out of positioned along the

outer periphery of the different parts of the machine 10 identified as potentially dangerous areas..." In the Schiffbauer '986 warning system, the transmitter antenna is used to transmit the magnetic field signal that defines the hazardous zone of the machine. (See, Schiffbauer '986 at column 4, line 60 through column 5, line 10.) With the single ferrite loop antenna 50 of the receiver means 26, however, the receiver means' circuitry indicates the level of this magnetic field signal in only the single axial direction.

Because Schiffbauer '986 fails to teach or suggest at least the recited circuitry that indicates a level of the received directional signal in a plurality of different directions, claim 1 clearly is novel and patentable over this reference.

Patentability over Schiffbauer '986, Bentley, Kirtley, Schiemann and Sivakumar

Claims 2-4 and 16-17 have been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 in view of Bentley et al., U.S. Patent No. 4,263,597 [hereafter "Bentley"].

Claims 6-9 and 18-21 have been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 in view of Bentley and Kirtley et al., U.S. Patent No. 4,849,735 [hereafter "Kirtley"].

Claim 22 has been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 in view of Bentley, Kirtley, and Schiemann, U.S. Patent No. 4,518,009 [hereafter "Schiemann"]. Claim 10 has been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 in view of Bentley, Kirtley, and Sivakumar, U.S. Patent Application Publication No. US2002/0049056 A1 [hereafter "Sivakumar"]. Applicant traverses the rejections.

Claims 2-4, 6-10 and 18-22

Claim 2 recites, "x-axis receiving means directed along a x-axis and receiving a signal from a hazard zone transmitter; y-axis receiving means directed along a y-axis and receiving a signal from said hazardous zone transmitter; z-axis receiving means directed along a z-axis and

receiving a signal from said hazardous zone transmitter, the x-, y-, and z-axes generally being mutually perpendicular to each other..."

Claim 18 similarly recites, "a x-axis receiver having an antenna directed in a first direction; a y-axis receiver having an antenna directed in a second direction, said second direction being perpendicular to said first direction; a z-axis receiver having an antenna directed in a third direction, said third direction being perpendicular to the plane of said first direction and said second direction..."

The cited references either individually or in combination fail to teach or suggest the claimed hazard warning system/proximity receiver with a mutually perpendicular 3-axis antenna.

As discussed above, Schiffbauer describes a warning system with a single axis ferrite antenna.

The Office alleges, "Bentley et al. teach the receiver including three directional, axis receiver signal..." Applicant respectfully disagrees.

Actually, Bentley describes a nondisruptive automatic radio direction finding system "having inputs for four quadrature antennas each having a cardioid pattern." (See, Bentley at Abstract.) Bentley further describes, "a particular type of antenna useful in this application is shown on the drawing for illustration and was filed Mar. 14, 1979 with application no. 20,295." (See, Bentley at column 2, lines 28-31.) The antenna depicted in the application referenced by this statement in Bentley is a disk-shaped directional annular slot antenna. (See, Luedtke et al., U.S. Design Patent No. 260,895, a copy of which is submitted herewith as Exhibit A.) Bentley depicts a disk-shaped annular slot antenna in Figure 2 with 4 output ports 59 that provide "four quadrature cardioid pick up patterns." (See, Bentley at column 6, lines 1-3.) For convenience, an article from the Mathworld web site defining the term, "cardioid," is submitted as Exhibit B

herewith. These cardioid pick up patterns from the output ports of the disk-shaped annular slot antenna in Bentley's Figure 2 therefore appear to be in four directions all within a same plane. Bentley therefore fails to teach or suggest the recited receiver with antennas at three mutually perpendicular axes.

Further, none of the remaining cited references teaches or suggests the three mutually perpendicular axes receiver antennas.

For at least this reason, claims 2-4, 6-10 and 18-22 should be allowable over this art.

Claims 16-17

Claims 16 and 17 depend from claim 1, which (as amended) recites, "means for determining based on the indicated levels of the received directional signal in the plurality of different directions whether a received signal indicates proximity to an attendant hazard." The cited art fails to teach or suggest at least this claim element.

As discussed in the Background of the present application, Schiffbauer '986 describes a hazard warning system that uses a receiver with a single axis ferrite antenna. More specifically, the Background section includes the following discussion of Schiffbauer '986:

So, especially in the close quarters of a mine shaft, it is important to know, as precisely as possible, when the operator or other personnel are within a safe distance of operating machinery or when they have entered the danger zone. To that end, U.S. Pat. No. 5,939,986 entitled "Mobile Machine Hazardous Working Zone Warning System" to Schiffbauer et al., issued Aug. 17, 1999, teaches a warning system for mobile working machinery that includes a loop-antenna transmitter and a receiver. This system includes loop antennas that are distributed about mining machinery to define a warning zone. The direction of the radiation from each loop is perpendicular to that loop. The shape of the zone is determined by the shape of each loop antenna disposed about the particular machine. The strength of the loop antenna field decreases with one over the cube of the distance from the loop. A personnel warning device and receiver is worn by a protected individual and includes a single ferrite loop antenna that receives the signal as a person enters the field.

While the system taught in Schiffbauer et al. provides some warning to the wearer, it does not provide positional accuracy because both the loop radiation and the receiver antenna are directional. At any distance from the loop, signal strength is

maximum when the receiver antenna is perpendicular to the loop and is minimum when the receiver antenna is parallel to the loop. So, signal strength varies depending upon the direction of the single receiver antenna to the loop antenna, at any given distance from the loop. Thus, it is difficult to determine whether the signal strength is due to antenna alignment or distance from the loop.

Accordingly, Schiffbauer '986 fails to teach or suggest the recited determination based on the indicated levels of the received directional signal in the plurality of different directions whether a received signal indicates an attendant hazard.

Bentley also fails to teach or suggest determining an attendant hazard based on levels of a received directional signal in a plurality of different directions. As previously discussed, Bentley describes an automatic direction finding system that uses a four quadrature directional annular slot antenna that has a cardioid pick-up pattern. (See, Bentley at Abstract; Figure 2; column 2, lines 25-34; and column 6, lines 1-11.) Bentley describes that the system provides "the ability to accurately indicate the bearing in degrees as well as display to the operator the relative direction from which the signal is coming." (See, Bentley at column 2, lines 13-16.) However, Bentley lacks any description or suggestion to determine proximity to the signal source from the quadrature cardioid pattern outputs of the antenna, or in any other way.

Because the references fail to teach or suggest at least the determination of a hazard proximity indication from levels of a received directional signal in plural different directions, claims 16-17 should be allowable over this art.

Patentability over Schiffbauer '986, Kirtley and Spencer

Claims 11 and 23-24 have been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 and Kirtley. Claims 12-15 and 25-26 have been rejected under 35 U.S.C. § 103 as unpatentable over Schiffbauer '986 in view of Kirtley and Spencer, U.S. Patent No. 4,906,972 [hereafter "Spencer"]. Applicant traverses the rejections.

Claims 11-15 and 23-26 depend from claim 1, which recites, “a receiver for receiving a directional signal indicating proximity of a hazard, and including circuitry that indicates a level of the received directional signal in a plurality of different directions;...” As discussed previously, this claim element is not taught or suggested by Schiffbauer ‘986. Further, Kirtley and Spencer also fail to teach or suggest this claim, either individually or in combination.

More specifically, Kirtley describes a radio controlled safety stop system for forklift trucks. Kirtley states, “Mounted on the forklift truck and provided with an appropriate antenna to detect the signals being transmitted, is a radio receiver which detects the radio signal when the forklift truck moves into the far distance zone included by the relatively weak radio signal...” However, Kirtley fails to provide any suggestion of other than a single-axis antenna described in Schiffbauer ‘986, and lacks any suggestion of circuitry that indicates “a level of the received directional signal in a plurality of different directions,” as recited.

Spencer describes a communication system for hazardous areas. Spencer states, “Each remote unit... is further advantageously provided with an integral motion sensor 24 suitably comprising a twelve connection mercury switch...” Spencer therefore also lacks any suggestion of circuitry that indicates “a level of the received directional signal in a plurality of different directions,” as recited.

Because the art of record fails to teach or suggest at least this element of the claims, claims 11-15 and 23-26 should be allowable.

Rejection of Claim 5

The Office action indicates claim 5 to be rejected, but fails to state any specific rejection of claim 5. In any case, claim 5 depends from claim 1, and should also be allowable for at least the reasons discussed previously that claim 1 is patentable over the art of record.

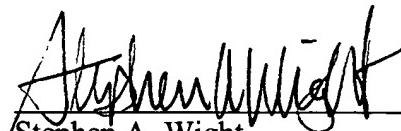
Conclusion

The claims as amended herein should be allowable. Such action therefore is respectfully solicited.

Respectfully submitted,

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